

Hiring Difficulties in Minnesota: Select Nursing, Engineering, and Production Occupations

EXECUTIVE SUMMARY

This study examines hiring difficulties—and more specifically, skills mismatches—in three occupational groups: nursing, industrial engineering, and select production occupations. These occupations were included in the study because there has been anecdotal evidence of shortages in these fields. Based on in-depth interviews with over 200 Minnesota employers about over 1,500 job vacancies, the major findings are as follows.

- While employers reported general hiring difficulties in 45 percent of vacancies, just 15 percent of all vacancies were hard-to-fill solely because of lack of adequate supply (that is, skills mismatches).
- Hiring difficulties were most frequently the result of a mix of supply- and demand-side problems.
- Incidents of skills mismatches were more commonly found in:
 - Vacancies requiring a *high school degree or less* compared to higher education levels.
 - Vacancies requiring *some (up to three years of) work experience* compared to both higher and lower levels of experience.
 - They were *equally common* in Greater Minnesota and the Twin Cities metro.
 - They were more common in the three *production occupations* included in the study than in either nursing or industrial engineering occupations.
- When employers discussed what they were looking for but not finding, it was often skills or a combination of skills that they associated with work experience. This was particularly true in nursing and engineering occupations. In production occupations, however, which had the highest incidence of hiring difficulties in general and skills mismatches in particular, employers frequently said that the problem was a lack of supply because of general disinterest in production work—i.e., an “image problem.”
- The different findings across occupational groups suggest that there is no one-size-fits-all solution that will work across sectors. Rather, it is important to build approaches that respond to the specific needs, problems, and gaps that employers face in different occupations and industries. An example of this sort of endeavor is the Workforce Assessment initiative conducted in 2012 by the Minnesota State Colleges and Universities system and the Minnesota Chamber of Commerce.
- The findings of the report also underscore the importance of precision around the concept of skills gaps or mismatches. Specifically, stakeholders should not equate hiring difficulties with skills gaps. This research reveals that skills mismatches are one of several underlying causes of hiring difficulties.

INTRODUCTION

During the past few years, there has been a great deal of discussion about the issue of workforce alignment in Minnesota—specifically, a phenomenon known as the skills gap. Recent studies¹ and popular press articles² warn us that employers cannot find an adequate supply of workers to meet the demands of the jobs they have: workers may lack the skills, experience, or education needed to adequately carry out job duties. Policymakers and educators in Minnesota are concerned about these deficiencies, and are motivated to ensure that workers’ skills align properly with what’s needed in the labor market.

Skills mismatches—that is, deficiencies in the workforce supply—become especially salient and problematic during the hiring process. If too few job applicants have the right skills, knowledge, or experience to qualify for the job (or if too few people apply for the position, period), then that is consistent with the interpretation that there is a gap, or mismatch,³ between workers’ skills (supply) and the skills needed to perform the job (demand).

On the other hand, it is important to realize that there are a variety of reasons an employer may have hiring difficulties, and that many of these have nothing to do with the available supply. Characteristics of the firm and/or the job itself could reduce the likelihood that candidates will choose to apply for or accept any given position. Some of the most basic “demand-side” factors include the wage offered, the hours of work, and the location of the work.

For a select group of health care, engineering, and production occupations, this research seeks to answer the following general questions:

- 1) How *prevalent* are hiring difficulties in Minnesota?
- 2) Among hard-to-fill vacancies, what share were hard to fill because of skill or education gaps, and what share were hard to fill because of demand-side factors?
- 3) Under what *conditions* are skills mismatches most likely to arise?
- 4) How serious a problem do skills mismatches represent for employers?

The answers to the first and second questions help us to quantify the scope of the problem. If a large proportion of vacancies are hard to fill exclusively because of an inadequate number of candidates with the right skills, education, or experience, then this provides evidence of skills mismatches in Minnesota. On the other hand, if a large share of hiring difficulties are due to demand-side factors, this provides

¹ For example, Carnevale, et. al, 2010, *Help Wanted: Projections of Jobs and Education Requirements Through 2018* (<http://cew.georgetown.edu/jobs2018/>).

² For example, Thomas Friedman, “If You’ve Got the Skills, She’s Got the Job.” (www.nytimes.com/2012/11/18/opinion/sunday/Friedman-You-Got-the-Skills.html?ref=thomaslfriedman)

³ We use the term “skills mismatch” in this paper to describe the general cases of misalignment between workers’ qualifications and the demands of jobs. This does not necessarily imply that workers need *more* education, skills or experience, but rather, that the qualifications they have simply do not match what is needed. This also reflects the way the concept has been measured in this study.

evidence against a skills gap, and addressing problems with hiring may require more than just fixing issues with the supply pipeline.

Answers to the third question help us to understand the correlates of skills mismatches. In which occupations, location, and job types are mismatches most likely to arise? This can help us to pinpoint the best actions to take to address the problem. Finally, the last question helps us to appreciate the implications of skills mismatches for employers. When employers have difficulty filling positions, does this indicate a serious problem for their business—or, more generally, for economic growth and development?

It is important to note that for the purposes of this report, we focus only on skills mismatches that arise during the hiring process (that is, that exist among new hires). We do not study skill deficiencies in the labor force more broadly, for example, in the incumbent workforce. Skills, of course, do not become irrelevant after a worker has been hired; particularly in today's labor market, skill needs are constantly evolving. Incumbent workers' skills fall outside the scope of this study, but it is important to understand them as well. Other initiatives, such as the Minnesota State Colleges and Universities system's Workforce Assessment project, have studied the skills and skill deficiencies of incumbent workers. For more information, see: www.MnWorkforceNeeds.org.

RESEARCH METHODOLOGY

The Minnesota Department of Employment and Economic Development, Labor Market Information Office (DEED-LMI) conducts a Job Vacancy Survey (JVS) of employers in the second and fourth quarters of each year. The JVS is a mail survey which asks a representative sample of Minnesota employers to provide information about their current job vacancies. Based on responses, DEED-LMI is able to construct reliable estimates of the number of job vacancies for the specific time period and region, by occupation, industry, and other variables. Comprehensive information about the JVS methodology is available here: www.positivelyminnesota.com/JVS.

This study on hiring difficulties leveraged the second quarter (spring) 2012 JVS. Once second quarter JVS responses were totaled, analysts selected a subset of reported vacancies for further study. The selection was based on occupation. In total, 213 establishments responded to the follow-up telephone survey, representing a 75 percent response rate. The data collected through the in-depth interviews were then scaled to produce estimates representative of Minnesota's labor market by region. Of the total 1,536 vacancies estimated, 896 were in nursing occupations, 165 in engineering occupations, and 475 in production occupations.

The research team intentionally chose occupations for which there was at least some anecdotal evidence of hiring difficulties. These were:

Nursing (N=896 vacancies)

- Registered Nurses
- Nurse Practitioners
- Nurse Anesthetists

Engineering (N=165 vacancies)

- Industrial Engineers
- Industrial Engineering Technicians
- Materials Engineers

Production (N=475 vacancies)

- Computer-Controlled CNC Machine Operators, Metal and Plastic
- Numerical Tool and Process Control Programmers
- Machinists

The selection of these occupations “stacked the deck” in favor of finding hiring difficulties and perhaps skills mismatches. For all reported vacancies in these occupations,⁴ the research team made follow-up phone calls to employers to ask further questions about their experiences filling these vacancies. The phone survey included questions about the position requirements, advertising strategies, hiring difficulties (including employers’ perceptions about the reasons for the difficulties), and the impact of the difficulty on the firm. The complete survey script is provided in Appendix A.

Measuring Skills Gaps

Although it is tempting to equate hiring difficulties with skills mismatches, the two are not the same. In this study, hiring difficulties are measured simply by employers’ responses to the question, “Did you have difficulties in filling this position?” (See Question 8 on the survey instrument; Appendix A).

When employers reported having difficulties filling a position, however, the interviewer asked them to provide more detail about the problems they encountered (see Question 9 on the survey instrument in Appendix A). Specifically, they could choose from two main areas of difficulty:

1. Hiring difficulties due to a mismatch between job requirements and the *training, skills, education, or experience* of applicants; and
2. Hiring difficulties caused by factors unrelated to the qualifications of the candidate pool, such as *unattractive wages, work hours, or geographic location*.

The first category of responses represents difficulties that are due to what we might consider skills mismatches. The second category represents difficulties that (employers perceive) are due to demand-side factors—problems that arise because of some characteristic of the job or firm. When describing difficulties, employers could select from either or both of these categories.

For the purposes of this report, we measure skills mismatches as those vacancies for which employers report no demand-side reason for the difficulty. In other words, when an employer reported that s/he did not get enough applicants with the right skills, knowledge, education, or experience for the position—and could not also identify a possible demand-side reason for this deficiency in the candidate

⁴ For Registered Nurses, the team randomly selected *one half* of all reported job vacancies from the second quarter 2012 JVS. Sampling one half of RN vacancies reduced the cost and time needed to complete the survey.

pool—we define this hiring difficulty as a skills mismatch. Since employers cannot have full information about what might be causing a lack of qualified applicants for any given position, it is not a perfect measure. However, given the elusiveness of the concept and the difficulty in accurately measuring the true supply of potential candidates who are appropriately prepared for a particular position, this measure is the best available to our knowledge to capture skills mismatches among new hires.⁵ Moreover, just as important as capturing hiring difficulties that are due exclusively to skills mismatches is the ability to capture reasons for difficulties *other than skills mismatches*. This allows us to separate those vacancies that employers perceive as difficult to fill at least in part due to something other than a deficiency in supply.

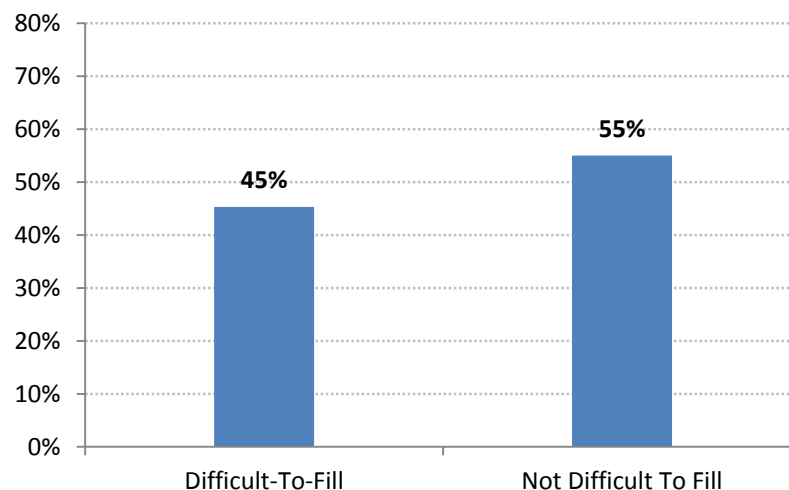
RESULTS

Section 1: How Prevalent Are Hiring Difficulties in Minnesota?

Overall Findings

Figure 1 presents employers' responses to the question, "Did you have difficulty filling this position?" (see Question 8 in Appendix A). Note that this question is broad and does not provide information on *why* the employer had difficulties filling the position; simply, whether or not the employer ran into challenges during the hiring process. We examine more closely the reasons for hiring difficulties in the next section of this report.

**Figure 1: Share of Vacancies Reported as Difficult to Fill
Overall, Spring 2012**



As shown in Figure 1, under half—45 percent—of vacancies were reported as difficult to fill. Recall that the occupations selected for study were not chosen to be representative of all vacancies in Minnesota. Rather, they were selected specifically *because* there has been anecdotal evidence of shortages in these particular positions. Therefore, it is difficult to know whether 45 percent represents a “high” or a “low”

⁵ Other measures involve estimating the overall supply (current or projected) of workers with certain levels of education and/or skills. However, we suggest that measuring skills mismatches at the point of hiring—based on employers' perceptions about what they were looking for and what they were finding—provides the most direct and concrete measure of a skills mismatch.

incidence of hiring difficulties. Nonetheless, Figure 1 provides helpful baseline information for interpreting subsequent findings.

Findings by Education Level

**Figure 2: Share of Vacancies Reported as Difficult to Fill
By Level of Education Required, Spring 2012**

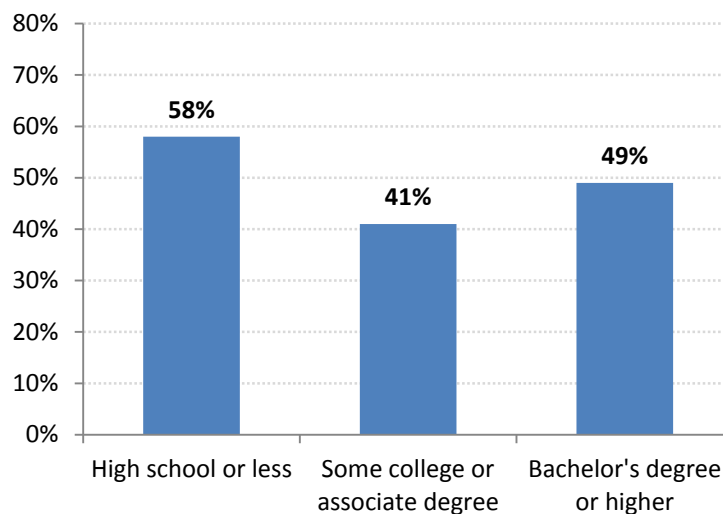


Figure 2 shows hiring difficulty by the level of education required by the vacancies. While we might expect to see more reports of hiring difficulties for positions requiring high levels of education, survey results do not support this. The vacancies that were most often reported as difficult-to-fill were those requiring a high school diploma or less (58 percent), compared to those requiring some college or an associate degree (41 percent) and those requiring a bachelor's degree or higher (49 percent). We explore this counterintuitive finding in section two of this report.

Findings by Experience Level

**Figure 3: Share of Vacancies Reported as Difficult to Fill
By Level of Experience Required, Spring 2012**

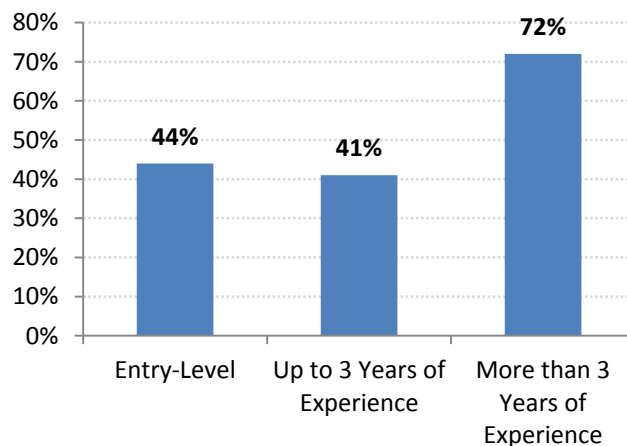


Figure 3 shows the share of vacancies that were reported as difficult-to-fill by the experience required. Reports of difficulties were about the same in entry-level jobs and in jobs requiring up to three years of work experience (which includes general work experience or experience in a related field). However, among vacancies requiring more than three years of experience, nearly three-quarters were difficult to fill. Clearly, all else equal, finding experienced job candidates presents a challenge for employers.

Findings by Region

**Figure 4: Share of Vacancies Reported as Difficult to Fill
By Region, Spring 2012**

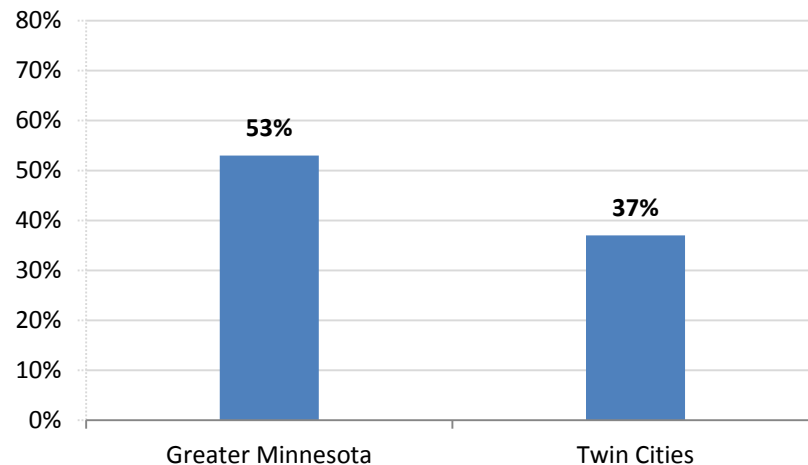


Figure 4 shows hiring difficulties by region. In Greater Minnesota, just over half of all vacancies were reported as difficult-to-fill, compared to 37 percent in the Twin Cities metropolitan area.

Findings by Occupation

**Figure 5: Share of Vacancies Reported as Difficult to Fill
By Occupational Group, Spring 2012**

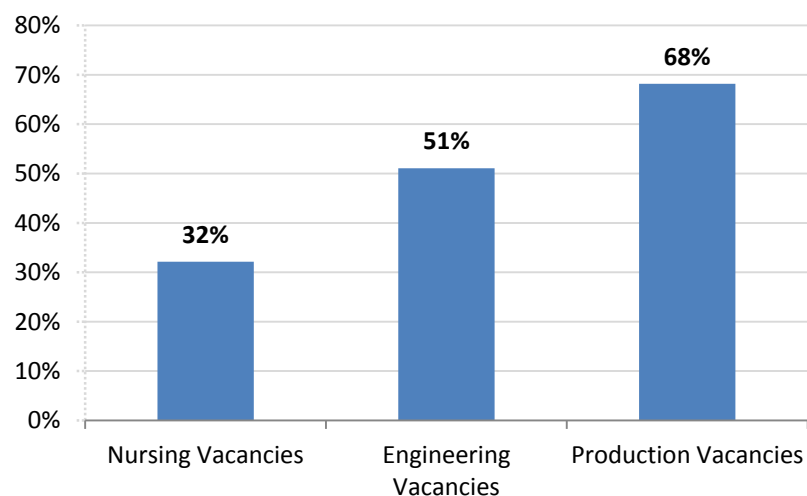


Figure 5 shows the share of hard-to-fill vacancies by major occupational grouping—in this study, these include nursing, engineering, and production occupations (see page 2 for a list of specific occupations in each major group). Interestingly, though we commonly hear about shortages in nursing occupations, nursing had the lowest share of difficult-to-fill vacancies (less than one-third) followed by engineering (about a half of all vacancies) and production (just over two-thirds).

Summary

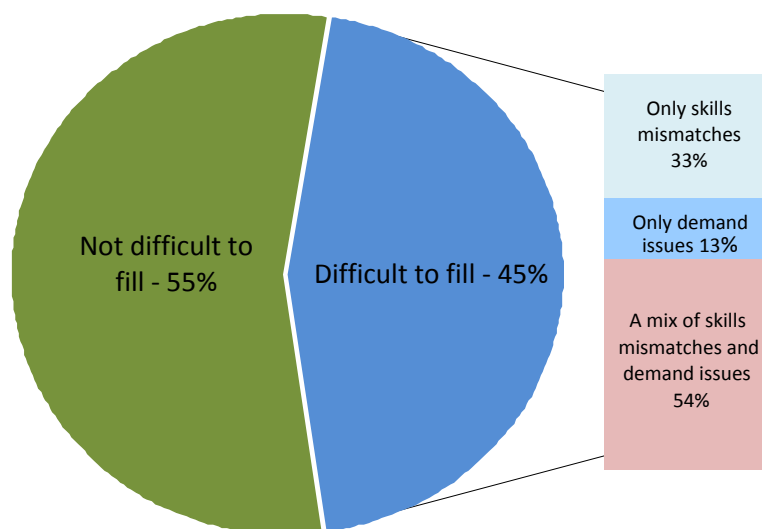
In summary, just under half of all vacancies in this survey were reported as difficult to fill. Job vacancies requiring lower levels of education (high school or below) were *more* often reported as difficult to fill than jobs requiring higher levels of education in this study, while job vacancies requiring high levels of experience (3 or more years) were substantially harder to fill than those requiring less. Vacancies were typically easier to fill in the Twin Cities metro than in Greater Minnesota. Finally, nursing had the lowest share of hard-to-fill vacancies (32 percent), followed by engineering (51 percent) and production (68 percent).

In the next section of the report, we take a closer look at just the difficult-to-fill vacancies. Specifically, our analysis asks: what share of these vacancies can be characterized as difficult to fill purely because of skills mismatches?

Section 2: Among hard-to-fill vacancies, what share was hard to because of skill or education mismatches (as opposed to demand-side factors)?

Overall Findings

Figure 6: Factors Perceived by Employers as Contributing to Hiring Difficulties
All Vacancies, Spring 2012



As illustrated in Figure 6, of those vacancies that were difficult to fill, just one out of three (33 percent) was perceived by employers as difficult to fill *exclusively* due to the lack of qualified candidates. That is, employers reported not having enough applicants with the right type of skills, education, or experience, and did *not* also indicate that there was a potential problem with the wage offer, the location, or the hours of work (demand-side factors). Assuming employers' perceptions are accurate, only this subset of vacancies was difficult to fill purely because of skills mismatches. This set of vacancies accounts for a small share of total vacancies in the study—approximately 15 percent.

For another 13 percent of difficult-to-fill vacancies, employers characterized the hiring difficulty as a problem on the demand side only. For these vacancies, employers did not report having too few applicants with the right qualifications, but they did say that wages, hours, or location contributed to the hiring difficulty.

Finally, more than one half (54 percent) of the difficult-to-fill positions were driven by a mix of skills mismatches and unattractive demand conditions. These vacancies defy clear categorization, because while employers reported not having enough applicants with the right skills, knowledge, or experience, they also identified possible demand-side problems (e.g., the wage offer, the location, or the hours of work) that could account for the hiring difficulty. The demand-side problems may, in fact, have *caused* the shortage of applicants, but it is impossible to know with certainty. What we can say is that there were not enough qualified applicants for the position, but there were other demand-side factors that might have been at play. Therefore, we label these cases as having neither purely skills mismatches nor purely demand-side problems.

In summary, then, the overall results suggest that *pure* skills mismatches—difficulties where employers did not also identify a demand-side problem—account for about one-third of all hiring difficulties, or about 15 percent of all vacancies total. Far more common were hiring difficulties that were perceived to be a mix of supply and demand. Least common were hiring difficulties that were only due to demand-side conditions. In the next section, we take a closer look at the conditions under which skills mismatches are most prevalent.

Section 3: Under what specific *conditions* are skills mismatches most prevalent?

Findings by Education Level

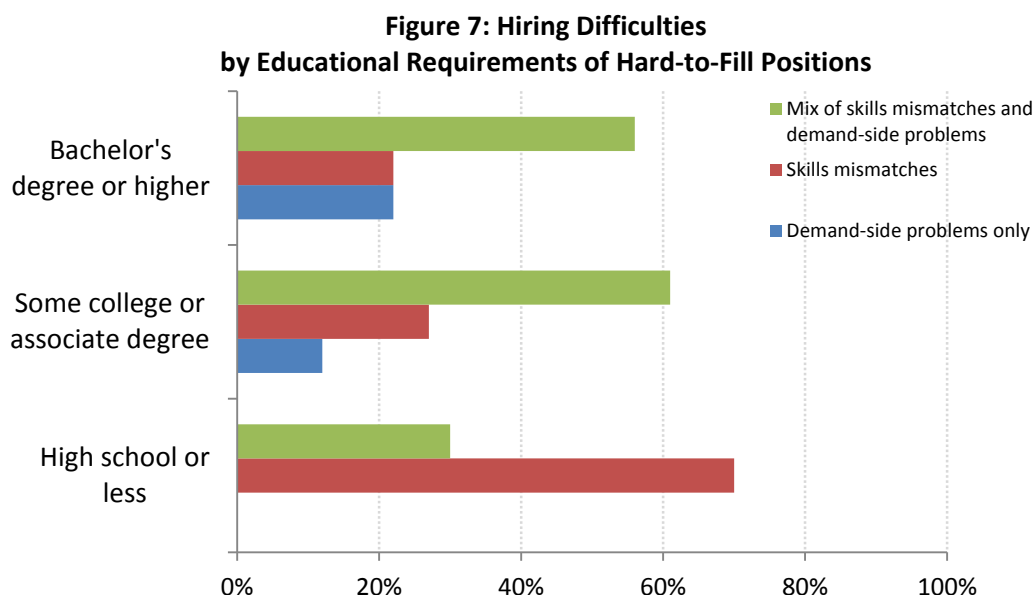


Figure 7 shows the perceived causes of hiring difficulties by the educational requirements of the position. Again, we might expect to see supply-side reasons cited more frequently the higher the educational requirements of the position. Instead we see the opposite. *In vacancies requiring a high school diploma or less, 70 percent of hard-to-fill positions were reported as being hard-to-fill only because of skills mismatches.* In no cases were demand-side reasons cited. On the other end of the spectrum—positions requiring a bachelor’s degree or higher—an estimated 22 percent were difficult to fill because of a mix of supply and demand issues, and another 22 percent were difficult to fill because of skills mismatches alone. Finding people with the right educational credentials does not appear to be the most critical problem for employers who are hiring workers at the high-end of the education spectrum. However, this curious relationship between educational requirements and skills mismatches might be explained by the type of occupations included in this study where experience is as important, or more important, to employers than education. We explore this possibility below when we look deeper into skills mismatches by occupational group.

Findings by Experience Level

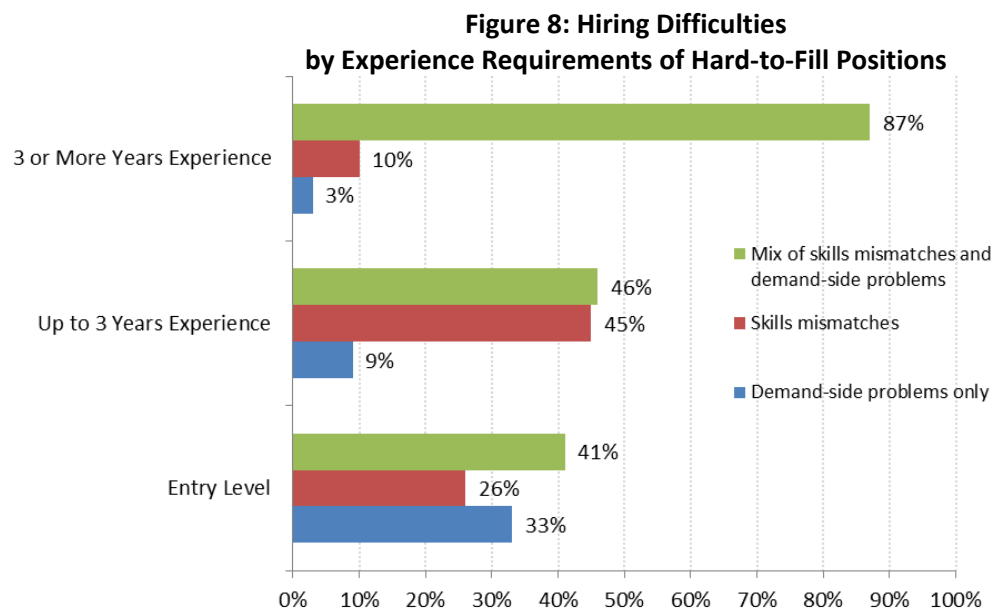


Figure 8 shows the reported reasons for hiring difficulties by experience level. Recall from the findings presented above (Figure 3) that positions requiring three or more years of experience were also most frequently reported as difficult to fill. For the vast majority of these high-experience positions—87 percent—the difficulties involved a mix of supply- and demand-side problems. Another 10 percent were caused by supply-side problems alone (skills mismatches), and just three percent by demand-side factors alone. At the other end of the spectrum, the difficulties in filling entry-level positions were frequently (one-third of the time) attributed to demand-side problems alone: wage, shift, or location. Interestingly, positions requiring up to three years of work experience were most commonly associated with skills mismatches. Nearly half—45 percent—of all these hard-to-fill positions were hard to fill purely because of skills mismatches.

Findings by Region

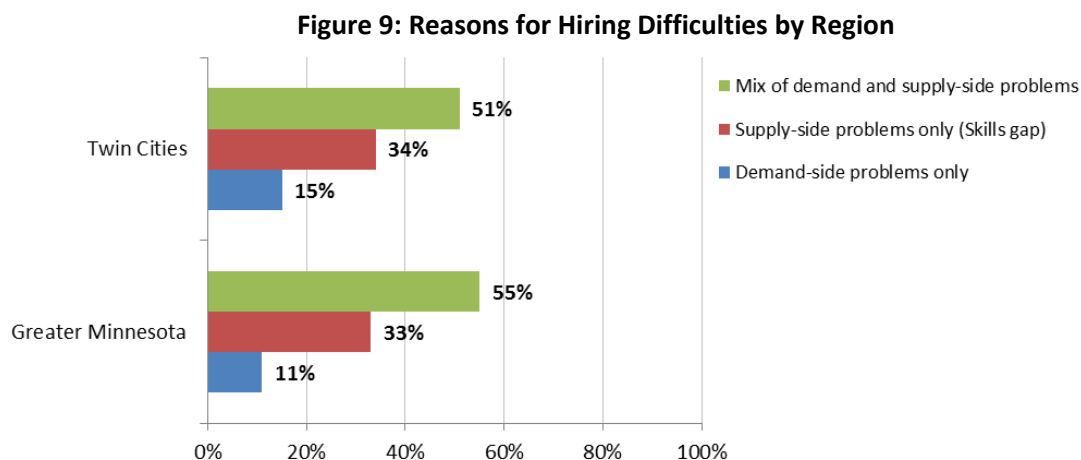


Figure 9 shows the reported reasons for hiring difficulties in both the Twin Cities and Greater Minnesota. While there were substantial regional differences in hiring difficulties overall (37 percent of vacancies were hard-to-fill in the Twin Cities, compared to 53 percent in Greater Minnesota; see Figure 4), the mix of reported supply-side and demand-side problems is essentially the same in both regions. Regardless of region, approximately one-third of hard-to fill vacancies were hard to fill because of supply-side (skills mismatch) factors as related to the hiring difficulty. In other words, the findings do not suggest that the hiring difficulties outside of the Twin Cities are more frequently due to skills mismatches.

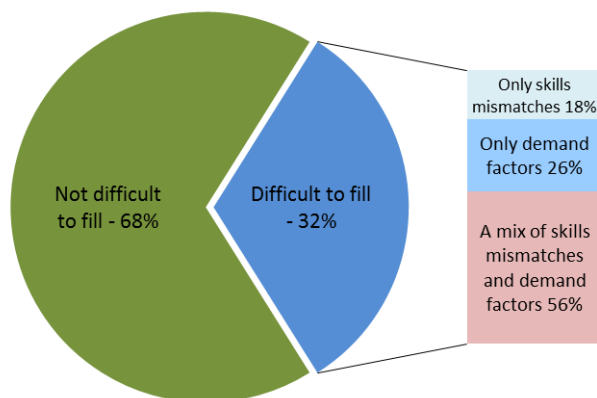
Location was more likely to be mentioned as a demand-side reason for hiring difficulties only somewhat more often in Greater Minnesota (45 percent of cases compared to 38 percent in the Twin Cities). In fact, a review of open-ended comments suggests that urban locations do not have as many advantages over non-urban areas as one might initially think. The advantage of a higher concentration of labor supply in urban areas can be seriously diminished by a high concentration of similar firms competing for the same talent pool. This has the effect of lowering the number of applicants for each vacancy and potentially raising wage expectations.

Still, the key finding here is that the same share of employers in Greater Minnesota and the Twin Cities (approximately one-third) point to skills mismatches *alone*. If location were a primary reason for a skills mismatch in Greater Minnesota, we would expect to see many more employers in Greater Minnesota citing that as the issue.

Findings by Occupation

Nursing: Low Overall Incidence of Skills Mismatches, Few Training Gaps

Figure 11: Factors Perceived by Employers as Contributing to Hiring Difficulties, Nursing Occupations (N=897)



Among all occupations surveyed, nursing occupations (which include Registered Nurses, Nurse Practitioners, and Nurse Anesthetists) had the lowest incidence of hiring difficulties, and also of skills mismatches as reported by employers. This is largely thanks to the success of Minnesota's post-secondary educational institutions in responding to the well documented nursing shortage over the past

decade. Only 18 percent of hard-to-fill positions (or six percent of *all* nursing positions) were reported as hard-to-fill exclusively because of skills mismatches, while the remaining were driven by a mix of skills mismatches and unattractive demand (See Figure 11).

Table 1: Nursing Skills Mismatches by Education Level Required

Education Level	Share of Nursing Skills Mismatch Vacancies	Share of all Nursing Vacancies
Bachelor's Degree or Higher	51%	3%
Some College or Associate Degree	49%	3%
High School or Less	0%	0%

The data in Table 1 zero in on the skills mismatch vacancies alone. This helps us to more closely examine the relationship between educational requirements and skills mismatches in nursing vacancies. Among those vacancies that are hard-to-fill purely because of skills mismatches, 51 percent required a bachelor's degree or higher, and another 49 percent required some college or an associate degree (in the case of nursing occupations, no vacancies required less than an associate degree). This indicates that employers report skills mismatches at about same rate when hiring nurses with 4-year degrees and those with 2-year degrees. The implication is that education level alone is not driving skills mismatches among nursing vacancies.

Table 2: Nursing Skills Mismatches by Experience Level Required

Experience Level	Share of Nursing Skills Mismatch Vacancies	Share of all Nursing Vacancies*
3+ Years of Experience	13%	0.9%
Up to 3 Years of Experience	76%	5%
Entry-Level jobs	10%	0.7%

*1 percent of vacancies have missing data on experience requirements.

Table 2 presents reports of skills mismatches by experience requirements of nursing jobs, allowing us to better understand the relationship between skills mismatches and experience. The story here is different from what we saw in Table 1. For nursing vacancies, higher experience requirements are associated with skills mismatches. More than two-thirds of all nursing skills mismatches were reported in jobs requiring up to three years of work experience. Just 10 percent of skills mismatch cases were reported in entry-level positions, and, perhaps somewhat surprisingly, just 13 percent of cases were in jobs requiring more than three years of experience. In general, these findings suggest that for nursing vacancies, it is experience rather than education that creates the greatest difficulty for employers.

Employers' open-ended comments support this conclusion. Below are some illustrative open-ended comments from respondents:

- *"Candidates had the required years of experience as a RN, but their experience was in long term care facilities not in a hospital, and that's a different animal."*
- *"Applicants had no experience, just a nursing graduate degree; or had no experience in home health assisted living."*

While these differences are not explored in the tables above, it is important to note that among Nurse Practitioners and Nurse Anesthetists, employers more frequently mentioned the problem of finding adequately trained applicants, compared to Registered Nurse vacancies.

Engineers: Low Overall Incidence of Skills Mismatches, Few Training Gaps

**Figure 12: Factors Perceived by Employers as Contributing to Hiring Difficulties
Sampled Engineering Occupations, Spring 2012 (N=165)**

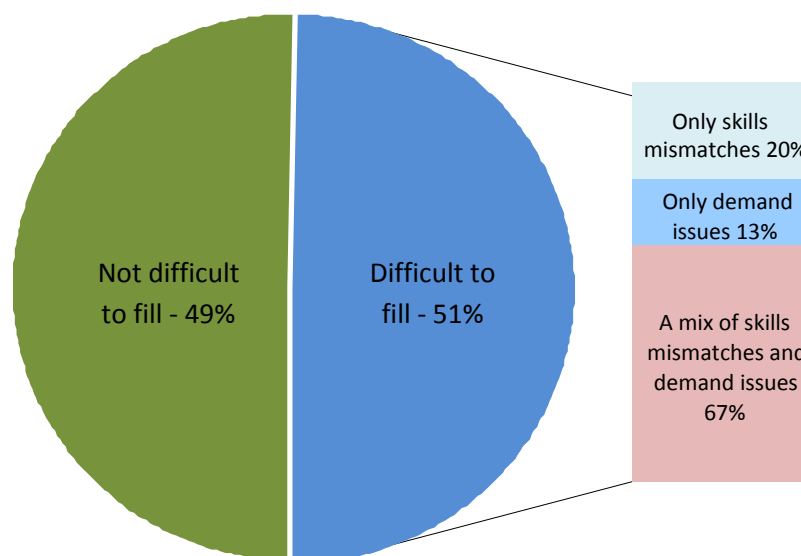


Figure 12 examines the share of difficult-to-fill vacancies—and cited reasons for the difficulty—among engineering occupations in the study. This group is overwhelmingly comprised of Industrial Engineers, with a very small handful of Materials Engineers and Industrial Engineering Technicians included.

There were more reported hiring difficulties in these engineering occupations compared to both the average across all occupations (Figure 6) and nursing professions (Figure 11). However, like nursing, a minority of cases (20 percent) were difficult to fill only because of skills mismatches with no other demand-side factors identified. (This 20 percent of difficult-to-fill vacancies represents just ten percent of engineering vacancies total.) Employers cited only demand-side reasons in 13 percent of these cases, and a mix of supply and demand factors in 67 percent of difficult-to-fill cases.

Engineering Skills Gaps by Education and Experience

Table 3: Engineering Skills Mismatches by Education Level Required

Education Level	Share of Engineering Skills Mismatch Vacancies	Share of all Engineering Vacancies
Bachelor's Degree or Higher	100%	10%
Some College or Associate Degree	0%	0%
High School or Less	0%	0%

Table 3 shows the breakdown of engineering skills mismatch vacancies by educational requirements, again allowing us to examine the relationship between education and skills mismatches among engineering vacancies. Not surprisingly, all reports of skills mismatches occurred in vacancies requiring at least a bachelor's degree. This likely is related to the educational requirements of engineering vacancies overall. Engineering occupations primarily require 4-year college degrees.

Table 4: Engineering Skills Mismatches by Experience Level Required

Experience Level	Share of All Engineering Vacancies with Skills Mismatches	Share of all Engineering Vacancies, Total*
3+ Years of Experience	63%	5%
Up to 3 Years of Experience	37%	3%
Entry-Level jobs	0%	0%

*2 percent of vacancies have missing data on experience requirements.

Table 4 presents the incidence of skills mismatches by experience requirements of engineering jobs. Here again, we see that skills mismatches become more common the more experience is required. More than half—63 percent—of skills mismatches were reported in jobs requiring three or more years of experience; the remaining 37 percent were reported in those requiring up to three years of experience.

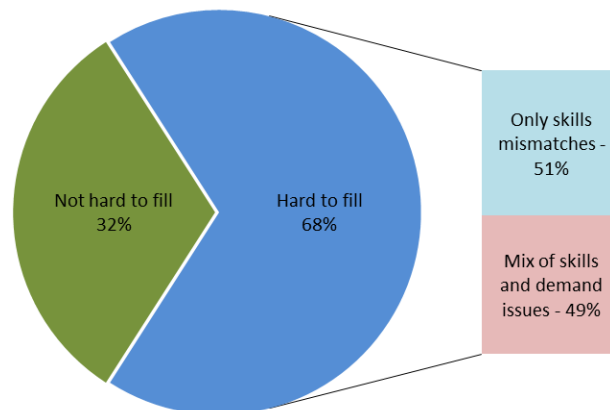
A look at the open-ended comments from engineering employers underscores that the main supply-side problem was work experience, and importantly, the skills obtained through that experience. Interestingly, when questioned about the types of experience they were looking for, employers often cited specific skills and background that were missing as a result of not enough (or the wrong type of) work experience. The lacking skills were more frequently those that could be learned on the job, not necessarily through a training program.

- *"We had plenty of industrial engineers applying but not enough of them had printing background."*
- *"Not as many people have the combination of a packaging engineering degree and three or more years of experience."*
- *"We always have difficulties filling this position because we require specific experience...in the electronics industry. It's not like a walk-in position."*
- *"We were seeking previous manufacturing leadership experience...along with computer skills and desire to continue to grow. We did not see many applicants with that combination of skills."*
- *"We had a lot of applicants...and it took more time drilling down to find the people that actually had the experience that we were looking for. Seems to be a dying breed of people that have experience doing CAD drawing, reading blueprints and schematics..."*
- *"We always have difficulties filling this position because we require specific experience in test engineering in the electronics industry. There might be total of 150 qualified people in the Midwest! Without spending 1 to 3 years training them you won't have what you need."*

To summarize, the findings suggest that only about 10 percent of industrial engineering vacancies were hard to fill purely because of skills mismatches. Of those, the vast majority lacked specific blends of skills that employers viewed as being related to work experience.

Production Occupations: High Incidence of Skills Mismatches, Moderate Training Gaps

Figure 13: Factors Perceived by Employers as Contributing to Hiring Difficulties, Production Occupations (N=475)



Among all occupations surveyed, production occupations had the most difficult-to-fill vacancies, and the most that can be attributed purely to skills mismatches. Skills mismatches accounted for just over half of the hard-to-fill vacancies (more than one-third of all vacancies), and the remaining 49 percent were due to a mix of supply and demand factors (see Figure 13).

Table 5: Production Skills Mismatches by Education Level Required

Education Level	Share of Production Skills Mismatch Vacancies	Share of All Production Vacancies
Bachelor's Degree or Higher	0%	0%
Some College or Associate Degree	46%	19%
High School or Less	54%	16%

Table 5 presents the incidence of skills mismatches reported at the three levels of educational requirements. Here, we see that more than half of all skills mismatches were reported among production jobs requiring a high school diploma or less, and the remaining 46 percent were reported among those jobs requiring some college or an associate degree.⁶ This finding is perhaps not unexpected, since the production occupations in the sample (CNC Machine Operators; Numerical Tool and Process Control Programmers; and Machinists) rarely require a 4-year degree. However, the fact

⁶ This finding likely accounts for the counterintuitive relationship between education and skills mismatches shown in Figure 7. Skills mismatches are not more common among high school diploma occupations overall, but it appears so because production occupations are such a large subset of the sample.

that skills mismatches are so common in these occupations requiring relatively low levels of education is instructive, and certainly suggests that a nuanced approach that considers the specific needs in a particular industry or set of occupations is likely to be more effective than a one-size-fits-all approach designed to apply across all occupations.

Table 6: Production Skills Mismatches by Experience Level Required

Experience Level	Share of Production Skills Mismatch Vacancies	Share of all Production Vacancies
3+ Years of Experience	1%	5%
Up to 3 Years of Experience	77%	26%
Entry-Level jobs	22%	4%

Table 6 shows the incidence of skills mismatches by experience requirements of production vacancies. Skills mismatches were most commonly reported in vacancies requiring up to three years of experience (77 percent) but not altogether absent in entry-level positions, where nearly one-quarter were difficult to fill because of reported skills mismatches.

Analysis of the open-ended responses sheds more light on these findings. Employers perceive training gaps even in occupations requiring only a high school degree, such as machine operators. Employers hiring low-skilled production occupations lament the disappearance of machine-shop classes at the high school level, while employers hiring high-skilled production occupations lament the fact that not enough K-12 students are encouraged to pursue 2-year degree programs or trade schools.

If positions requiring a high school degree are almost as hard to fill as those requiring a 2-year degree, the root of the problem is much deeper than lack of training. In low-skilled production occupations, the problem is one of low quantity more than low quality: not enough individuals are interested in applying for these jobs.⁷ And even in high-skilled production occupations where qualifications truly matter, most employers believe their hiring difficulties to be related to a poor image of blue collar work. They tend to equate this issue only with “talent gaps,” when in fact the declining number of individuals interested in factory work might have something to do with perceived (or real) unattractive demand conditions such as weekend shifts, rigid work schedules, low wages, and repetitive work tasks.

Some employers also report difficulties finding candidates with the right level, and even more specifically the right type, of hands-on experience. In high-skilled production occupations such as machinists, experience requirements are fairly specific and employers themselves admit they cannot be fully developed through formal training. Just like for nurses and engineers, experience requirements are often so specific that even if the pipeline of trained individuals were bigger, lack of work-based experience could still be a barrier to getting a job.

Illustrative open-ended comments from employers in production facilities include:

- *“Applicants had training but no practical experience on our machines.”*

⁷ For low-skilled production occupations, a few employers report difficulties finding candidates who show up on time, do not break the machines, and do not quit after two months.

- *“When machinists are done with school they get hired up! So we did not have enough applicants. One kid had experience but not specific to the equipment. We train as best we can but sure it would be easier to get someone out of school.”*
- *“Nobody goes to school for it anymore. Blue collar factory work is not what people want. They don’t want to go to school to learn the trades.”*
- *“[We need] experience as a CNC machinist and/or the machine tool technology degree. We’re not seeing enough of that.”*

In many positions reported as hard to fill citing education as a reason, experience could count as a substitute for a 2-year degree. This should caution against prescribing more post-secondary education, which creates a more expensive category of candidates to hire. A combination of formal schooling and apprenticeships, or paid internships, would probably benefit employers the most.

Summary

The prevalence of skills mismatches in comparison to other factors varies by occupation, but one finding is consistent across the board: the leading causes of hiring difficulties are a mix of supply and demand reasons. Supply issues rarely occur in isolation because they tend to be a function of location, firm characteristics, and more or less attractive job offers.

When skills mismatches were cited as a problem, most employers report being unable to find candidates with experience in a specific role or industry rather than more formal education. In general, employers labeled as skills mismatches the difficulties they encountered when trying to fit the specific experience requirements of a job with the experience profile of candidates. Unfortunately this match is hard to achieve even when supply of qualified labor is abundant.

When demand-side factors were cited as a problem, undesirable location was most frequently mentioned as the culprit, followed by uncompetitive wages or compensation in general, work shifts, and competition from other employers to attract talented workers.

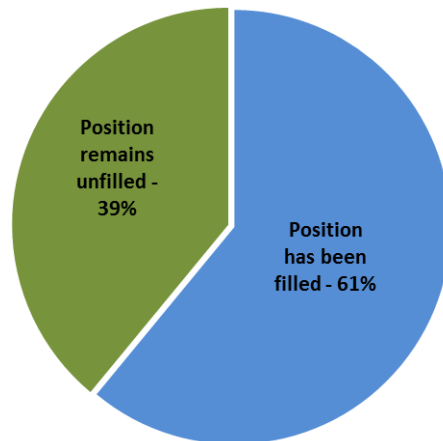
Section 4: How serious a problem do skills gaps represent for employers?

Even if employers experience hiring difficulties—and even *when* those difficulties are due to skills mismatches—how big a problem does this create for employers? The survey results provide several ways to investigate these questions.

Do Skills Gap Positions Remain Unfilled?

First, if the impact of skills gaps is severe, we would expect a high proportion of those skills-gap-related, hard-to-fill vacancies to remain unfilled at the time the survey was conducted.

Figure 14: Portion of Hard-to-Fill, Skills-Gap-Related Positions that Remained Unfilled



What we see, instead, is that sixty-one percent of these vacancies were successfully filled by the time the survey was conducted—that is, between three and eight months from the time the position was reported as open. (See Question 6 in Appendix A for question wording.) This result suggests that most skills mismatches presented temporary hiring difficulties but did not prevent employers from hiring.

The Consequences of Not Filling Positions

The severity of skills mismatches can also be assessed by looking at the consequences on the firm of not filling the 39 percent still unfilled vacancies. If skills mismatches were severe, very few people would be qualified to fill the role of these vacancies. It would be hard for employers not only to redistribute the work over current employees, but also to outsource the work. The inability to hire, therefore, would then have a wide-reaching, disruptive impact on the firm.

There are four types of possible impacts of not filling a position within the desired period of time:

1. At the lowest level, the inability to fill a vacancy can impact the closest group of co-workers that have to fill in for the position, causing staff overload or stress.
2. At the intermediate level, it can impact the firm financially by forcing it to pay temporary workers or outsource the work.
3. At an intermediate-high level, it impacts broader firm operations such as the activities that determine business expansion and growth.
4. At the highest level, it can threaten the ability of a firm to meet customer demand, meaning the core activities of a firm. The effects would spill over and cause damage not only internally but externally to customers, suppliers, or the local community.

Impacts on more than one level of the firm, and especially on the core business activities, would offer evidence of severe consequences of skills mismatches in this group of jobs.

Table 7: If you don't fill the position within your desired time frame, what could the impact be on your business? (N=235)⁸

Type of impact	Percent of cases affected
Staff overload and/or stress	12%
Increased costs due to the need to hire contractors or pay overtime	82%
Inability to expand or innovate	38%
Inability to meet customer demand or maintain quality levels	38%

In 12 percent of all cases the impact was felt on the closest co-workers which can potentially lead to employee dissatisfaction and turnover. When this option becomes untenable, the next step is hiring contractors or temporary workers until the position is filled. Although this may increase the cost for the firm, it is still feasible if the right skills are available in the pool of contract workers. The high share of these cases (82 percent) suggests that overall supply isn't lacking but is accessible at a higher price.

In 38 percent of cases, employers reported that the lack of qualified candidates impaired the firm's ability to expand or innovate. This was reported especially for industrial engineer positions, because they lead R&D, product development, and technological advancements and their skills are very hard to substitute for. Finally, the most serious impacts were felt in 38 percent of cases, when a prolonged problem of skills mismatches can affect the ability of a nursing home to serve patients or of a factory to fulfill orders. This can lead to a loss of business if the hiring difficulty persists. Since only a minority of cases fell into the last category, the conclusion to draw is that the skills mismatch problem that made these vacancies hard to fill in the first place was fairly contained.

CONCLUSION AND IMPLICATIONS

The findings presented above suggest the following. First, hiring difficulties were fairly common among nursing, industrial engineering, and production occupations. Nearly half of all vacancies were difficult-to-fill. However, when these hiring difficulties were investigated more closely, just one out of three were due exclusively to skills mismatches. This represented about 15 percent of all the vacancies studied.

Second, across occupations, work experience was more closely associated with skills mismatches than education. Employers were more likely to report skills mismatches when they were recruiting for workers with relatively high levels of experience. Moreover, the open-ended comments indicated that employers were more likely to equate work experience (and not necessarily formal education) with the skills they were looking for.

Third, the study revealed interesting details about skills mismatches in our three occupational groups. Overall, both nursing and engineering vacancies had relatively low shares of reported skills mismatches

⁸ The frequencies in Table X are based on analysis of both closed- and open-ended responses to Question 10 on the survey (see Appendix A).

(six percent of all nursing vacancies and ten percent of all engineering vacancies). Skills mismatches were more common in production occupations, present in more than one third of all vacancies. In open-ended comments, employers attributed this largely to a lack of interest, or an “image problem” in production work.

Finally, the findings revealed that the impact of skills mismatches was, in general, not devastating to companies.

What do these findings suggest for the skills mismatch conversation more generally? First, they suggest that precision is important, both as we discuss the issue and as we decide what actions to take. The research reveals that “hiring difficulties” are not synonymous with skills mismatches. While we should not take lightly the importance of a well-prepared workforce, we should also not take hiring difficulties as the only evidence of an ill-prepared workforce. Rather, we should understand the possible role of demand-side factors in creating difficulties—as well as the way supply- and demand-side factors can interact to create difficulties.

The study findings do indicate, however, that skills mismatches—misalignment of supply and demand—occur in pockets of Minnesota’s labor market. When they do, the policy and education response cannot be one-size-fits-all, but rather, should be customized to the industry or set of occupations facing difficulty. One example of a more nuanced and tailored method for studying and addressing employers’ needs is the approach taken by the Minnesota State Colleges and University system and the Minnesota Chamber of Commerce through their Workforce Assessment sessions in 2012. These sessions convened employers in specific industries and regions to listen to what employers were looking for but not finding, both in their incumbent workforce and new hires. (Results, in the form of employer comments, are available here: www.MnWorkforceNeeds.org). Such approaches ensure that the responses are tailored and flexible, and open a conversation among policymakers, educational institutions, and employers.

The answer may not be more education across the board. In the occupations studied here, a more appropriate response might be to find ways to provide hands-on experience and work-based learning to students who are still in college, for example, through internship programs. In the case of production occupations, it may mean going back further in the pipeline to provide career education, information and hand-on learning experiences at the K-12 level.

It is also worth asking what role employers might play. Where demand-side issues are driving the problem, employers may be in the best position to offer a course correction.

Appendix A: Hiring Difficulties Phone Survey

POSITION REQUIREMENTS

I'm going to start by asking you a couple of basic questions about the requirements of the position.

1. First, what level of education is usually required for this position?
 - a) **No educational requirement**
 - b) **High school/GED**
 - c) **Vocational training**
 - d) **Associate degree**
 - e) **Bachelor's degree**
 - f) **Advanced degree**
2. (If #1 = c, d, e, f):
Which specific field(s) of study are you looking for?
3. What is the minimum amount of work experience required for this job? Here, I'm going to read you a set of responses and have you tell me the one that best reflects this position
 - a) **No work experience required**
 - b) **Previous work experience of any kind**
 - c) **Internship, or practicum, or project that is related to this position**
 - d) **1 to 3 years of experience related to this position**
 - e) **More than 3 years of experience related to this position**
4. What is the expected hourly, monthly, or annual compensation?
5. Which of the following methods have you used to advertise the position?
 - a) **Did you post the position on your company's website?**
 - b) **Post the position on an online job bank, such as MinnesotaWorks?**
 - c) **Advertise by word of mouth?**
 - d) **Use networking strategies or social media, such as LinkedIn?**
 - e) **Did you use any other form of advertising? _____**

HIRING DIFFICULTIES

Next, I'm going to ask you some questions about your experience filling the position.

6. First, let me start by asking you: has this position been filled?
 - a) **Yes**
 - b) **No**

7. How long have you been trying / did it take to fill this position? Would you say it's been...
- a) Less than a month
 - b) Between one and three months
 - c) More than three months
8. And did you have / are you having any difficulties filling this position?
- a) Yes
 - b) No
 - c) Not sure because opening is too new
9. (If the position has been filled):
We'd like to get a sense of the difficulties companies are facing when trying to fill positions. So next, I'm going to read you a set of statements, and for each one, please tell me if it's true or not for this position.
- a) There weren't enough applicants with the right skills, knowledge, or experience. [if yes: Tell me more about this.]
 - b) There weren't enough applicants with the right work ethic or attitude. [if yes: Tell me more about this.]
 - c) There weren't enough applicants with the right type of education. [if yes: Tell me more about this.]
 - d) There weren't enough applicants with the right certifications or licenses.
 - e) The hiring difficulty was related to the wage being offered.
 - f) The difficulty was related to the location of the work.
 - g) The difficulty was related to the hours of work.
10. (If the position hasn't been filled and the employer had difficulties filling it):
If you don't fill the position within your desired time frame, what could the impact be on your business? Again, I'll read a set of statements and you can tell me yes or no for each one.
- a) Your company will be unable to meet customer demand or maintain quality levels [Yes/No]
 - b) Your company will be unable to expand or innovate [Yes/No]
 - c) You'll have increased costs due to the need to hire contractors or pay overtime [Yes/No]
 - d) Would there be any other impact on your company that you could think of? _____
11. Do you expect this position to require the use of new technologies over the next one to three years?
- a) Yes
 - b) No
 - c) Don't know
12. If (#11 = YES): What are examples of these technologies?

13. Do you see the skills, knowledge or tasks of this position evolving over the next one to three years?

- a) Yes**
- b) No**
- c) Don't know**

14. (If #13 = YES)

In what ways?

15. When you experience difficulties hiring for this type of position, what are some strategies that you'd be likely to use?

- a) Would you: hire someone who doesn't have all the qualifications you were looking for?**
- b) Would you: put the position on hold?**
- c) Would you: change your recruiting strategies?**
- d) Would you: increase the wage being offered?**
- e) Would you: distribute the work over your current staff?**

16. (If 15 = a)

You mentioned that you might hire someone who doesn't have all the qualifications you were looking for. What do you typically do in this situation to get the new hire up to speed?